The CNMS Nanoscience User Program

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BES/DOE Lehman Committee Review
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Oak Ridge, Tennessee

Selected Characteristics of NSRC User Access Policy

- **Open access based on scientific and technical quality**
  - Well-defined access policies & procedures posted on CNMS web site
  - Common Web Gateway for all DOE Nanoscale Science Research Centers
- **Flexibility to accommodate spectrum of user modes and needs**
  - "General Users": Access to existing tools / support / collaboration
  - "Partner Users": Enhance NSRC capabilities or contribute to operation, while carrying out research
- **External, peer-reviewed evaluation required (same for both modes)**
  - Simple and not burdensome for proposers or reviewers
  - **Proposal Review Committee** structured with expertise to review proposals of multidisciplinary collaborations / teams
- **Scheduling and speed**
  - Well-documented scheduling process, once proposal is accepted
  - Web-published turn-around policy for proposal review & experimental access

CNMS User Policy and User Modes of Access

General User Mode

- **Routine access to use existing CNMS equipment for user research**
  - **Majority of users enter by this mode**
- **Scope of General User projects is broad**
  - **Single experiment, small equipment set**
  - **Program-level proposals extending over many visits, wide range of equipment**
  - **Multiple years possible, based on successful renewal**
- **Includes collaborative proposals with CNMS staff as principals in a scientific team**

Partner User Mode

- **NSRCs must stay at the forefront in novel techniques & instrumentation to maximize benefit to user community**
- **This mode encourages significant collaborations that enhance capabilities or contribute to operation of the CNMS**
- **Outcomes are new or enhanced capabilities that must be made available to General Users**
- **Same peer review process as General Users**
  - **Additional criterion of anticipated benefit to the user community**
  - **Limited access to needed facilities, period of several years, renewable**
- **Periodic peer review for progress and completion**

CNMS User Policy and User Modes of Access

Rapid Access Proposals

- **Purpose: Provide avenue for rapid evaluation of proof-of-concept (feasibility) studies that:**
  - **require only small CNMS resources, and**
  - **are particularly time-sensitive**
- **Can be submitted "off cycle" in General User category**
- **Approved at any time, at discretion of the CNMS Director**
- **Director may request expedited peer review to assist decision, on a case-by-case basis**
- **Successful rapid access proposal expected to become a standard user proposal submission in next scheduled review cycle**

Proprietary Research

- **Majority of user research in the public domain and disseminated by publication in open literature**
- **NSRC "Policies and Procedures" permit access for proprietary research that *utilizes unique facilities* to *benefit the national economy***
- **Access either as General or Partner Users**
- **Full cost recovery required**
- **Efforts made to secure appropriate IP control for proprietary users, to permit applying results**

FY2003-2004 "Jump Start"

Initial User Program and Call for Proposals

GOAL

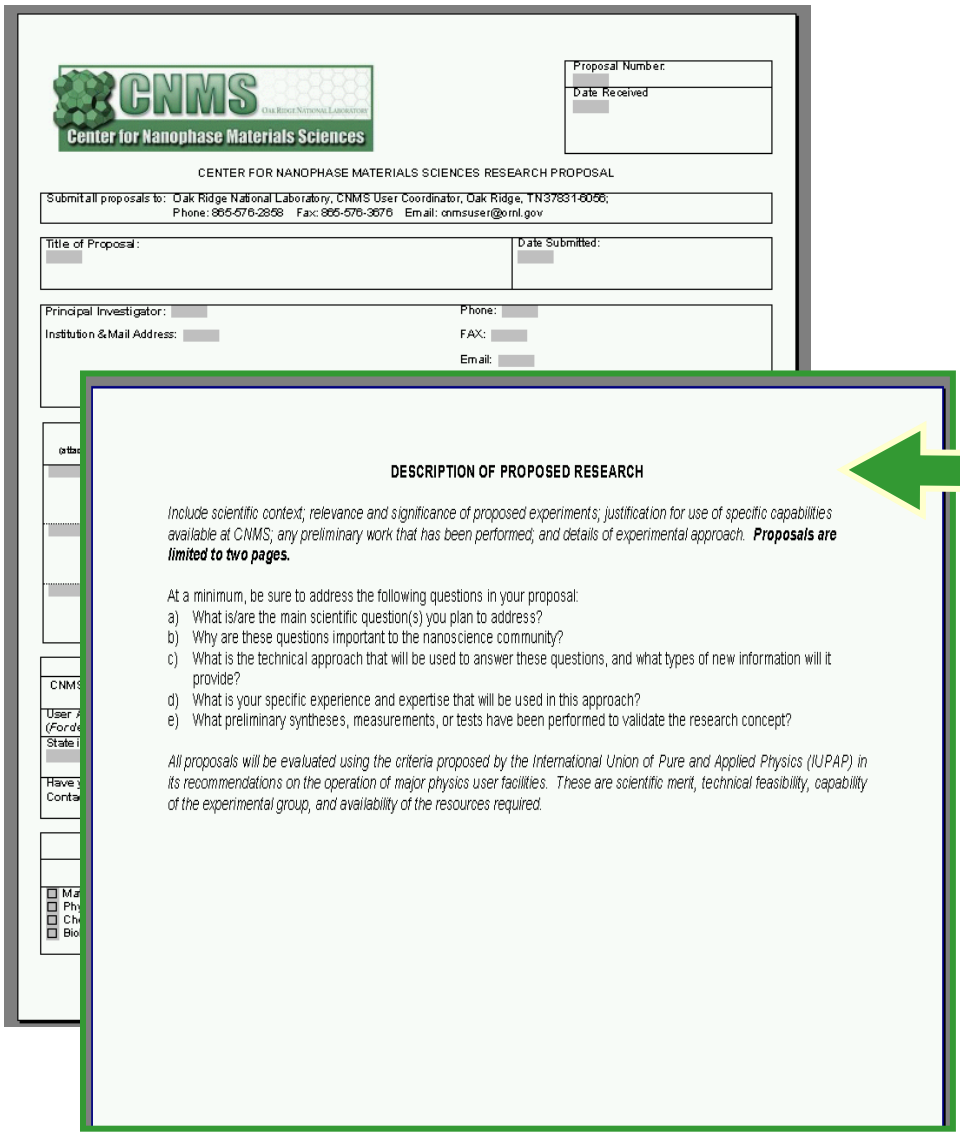
Leverage *existing ORNL capabilities* to develop a vibrant, interactive, and productive user community *before CNMS opens*

SELECTION OF RESEARCH AREAS

- **Design, Synthesis, Characterization of Macromolecular Materials**
- **Controlled Synthesis and Assembly of Functional Nanomaterials**
- **Nanomaterials Theory- topics related to August 2003 workshops**
- **Nanofabrication- in interim nanofab**
- **Nanoscale Imaging and Characterization**

FY2003-2004 "Jump Start"

Initial User Program and Call for Proposals



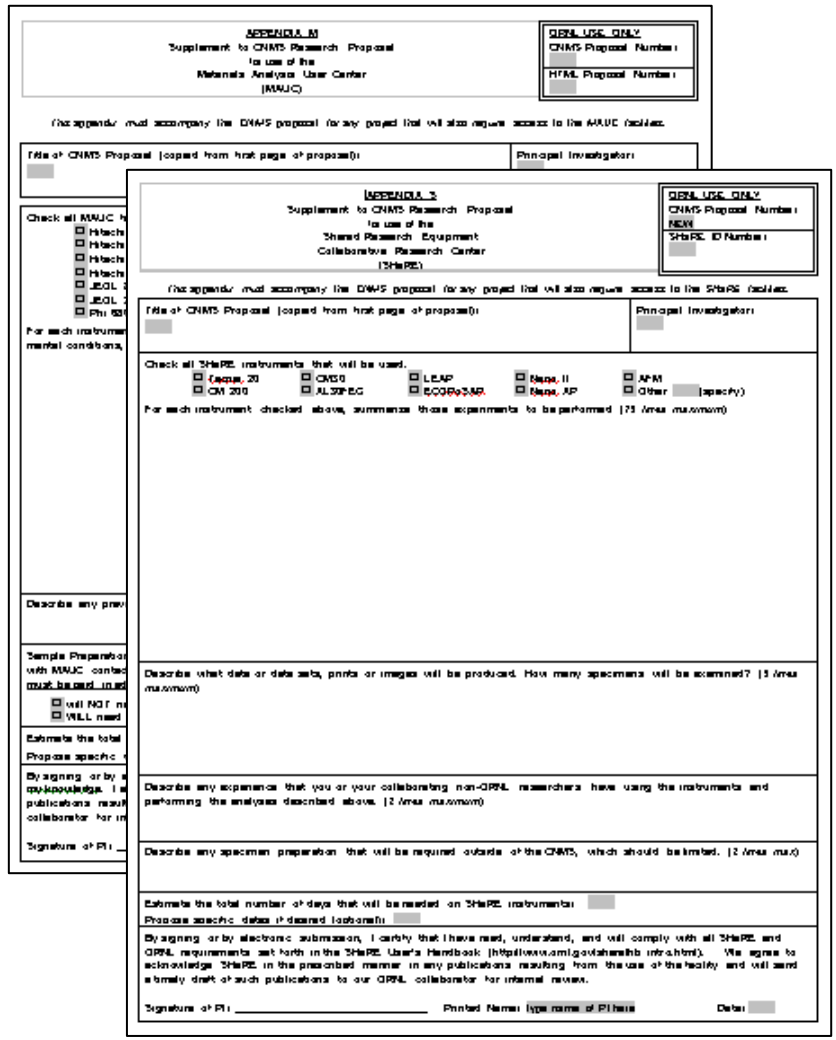
- **Proposals accepted on a specified schedule:**
  August 2003
  August 2004
  Steady state ~ 3-4 cycles/year
- **Features:**
  - **Equipment/Facility checklist**
  - **Two-page Project Description**
  - **Self-identification of research theme(s)**
- **Coordinated with other User Facilities at ORNL (Appendix)**

Vision for an Outstanding User Program

MOAs with Selected ORNL User Facilities

CNMS will internally coordinate requests to use other ORNL nanoscience research capabilities

- **CNMS Proposal Application Form includes Appendices for access to other User Facilities**
- **GOAL: Timely, "one-stop shopping" for all needed resources**
  - **All relevant facilities within single application form**
- **MOAs and Appendices already initiated for FY03-04 "jump start"**
  - **SHaRE, MAUC**
- **Future: CCS, SNS / HFIR, HTML**



APPENDIX M
Supplement to CNMS Research Proposal
for use of the
Materials Analysis User Center
(MAUC)

ORNL USE ONLY
CNMS Proposal Number:
HFIR Proposal Number:

This appendix must accompany the CNMS proposal for any project that will also require access to the MAUC facilities.

Title of CNMS Proposal (copied from first page of proposal):
Principal Investigator:

APPENDIX S
Supplement to CNMS Research Proposal
for use of the
Shared Research Equipment
Collaborative Research Center
(SHaRE)

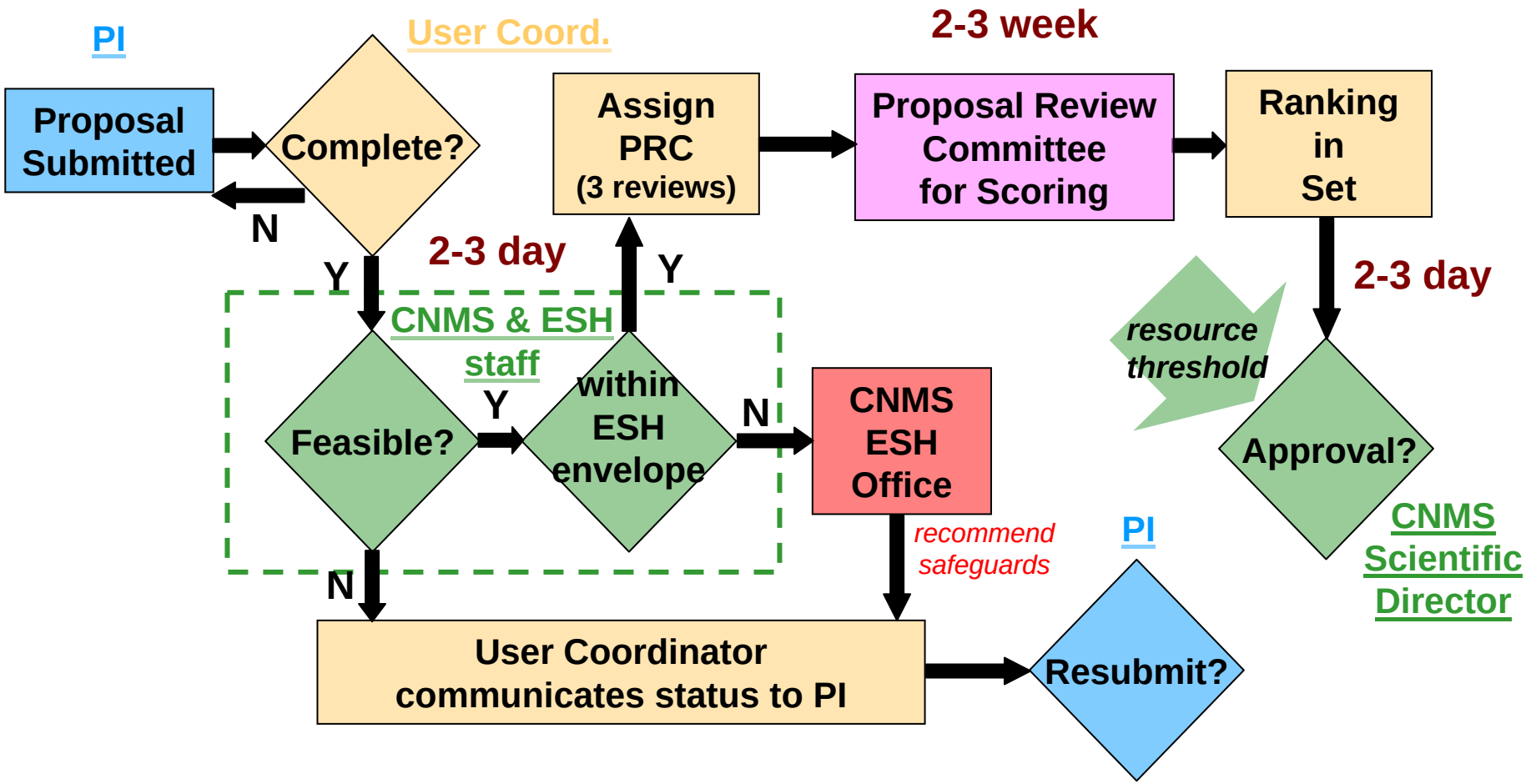
ORNL USE ONLY
CNMS Proposal Number:
HFIR
SHaRE ID Number:

This appendix must accompany the CNMS proposal for any project that will also require access to the SHaRE facilities.

Title of CNMS Proposal (copied from first page of proposal):
Principal Investigator:

Check all SHaRE instruments that will be used.
Describe what data or data sets, prints or images will be produced. How many specimens will be examined? (3 lines max/user)
Describe any experience that you or your collaborating non-ORNL researchers have using the instruments and performing the analyses described above. (2 lines max/user)
Describe any specimen preparation that will be required outside of the CNMS, which should be limited. (2 lines max)
Estimate the total number of days that will be needed on SHaRE instruments:
By signing (or by electronic submission), I certify that I have read, understand, and will comply with all SHaRE and ORNL requirements set forth in the SHaRE User's Handbook (http://www.uml.gov/share/ib_intro.html). We agree to acknowledge SHaRE in the prescribed manner in any publications resulting from the use of the facility and will send a timely draft of such publications to our ORNL collaborator for internal review.
Signature of PI: _____ Printed Name: type name of PI here Date:

Proposal Review Process Flow



Proposal Review Committee (PRC)

- **CNMS has a 14-member PRC selected prior to 2003 Call for Proposals**
- **All members external and not affiliated with ORNL or CNMS**
- **Members selected for experience and expertise in "jump start" areas**
- **Additional members will be added**
  - **Provide appropriate expertise as user program broadens**
  - **Balance reviewing load in especially popular research areas**
- **PRC members listed on CNMS web site with links to their own research web pages**
- **CNMS plans to promote the visibility of the PRC within its user community**

MEMBERS

Marco Buongiorno-Nardelli (North Carolina State)
Mary Galvin (Delaware)
Todd Giorgio (Vanderbilt)
Sharon Glotzer (Michigan)
Steve Granick (Illinois)
Robert Hull (Virginia)
Timothy Long (Virginia Polytechnic Institute)
Phillip Russell (North Carolina State)
Rainer Schad (Alabama)
Mark Shannon (Illinois)
Susan Sinnott (Florida)
Ya-Ping Sun (Clemson)
Z. L. Wang (Georgia Tech)
Otto Zhou (North Carolina)

Proposal Review Details

- **First step- CNMS staff provide narrative input on feasibility: level of difficulty or risk, resource demands**
  This input is added onto the proposal form to assist PRC review
- **Each proposal is reviewed by 3 PRC members with expertise in relevant research areas**
- **PRC members provide numerical scores based on IUPAP criteria (* *Recommendations for the Use of Major Physics User Facilities, 1996*)**
  - **50% Scientific Merit**
  - **30% Technical Feasibility**
  - **20% Capability of the Proposing Team**
- **PRC members provide additional "Overall Recommendation" of HIGH PRIORITY, RECOMMENDED, or NOT RECOMMENDED**
  Narrative comments are encouraged, but not required except for HIGH PRIORITY or NOT RECOMMENDED

Enthusiastic Response to Call for Proposals

71 PROPOSALS RECEIVED

- **Most from southern and eastern United States**
- **18 states represented**

DISTRIBUTION BY SOURCE

- **50 universities**
- **6 industry**
- **10 ORNL**
  - **Some with university collaborators**
- **5 foreign**
  - **Germany, France, China**

71 total

- **41 proposals selected for support, based on external *PRC* review**
  - **~ 10 on proof-of-concept basis**
- ***All active user research proposals now listed on CNMS web site***

Research Center for Nanophase Materials Sciences

A Highly Collaborative and Multidisciplinary U.S. DOE Nanoscale Science Research Center

http://www.cnms.ornl.gov

2004 User-Initiated Nanoscience Research Program

Tailoring Electrical Properties:PANI/SWNT's Composites
Principal Investigator: G. B. Blanchet (Material Science & Engineering, DuPont)
Collaborators: D. Geohegan (Oak Ridge National Laboratory)

Study of Nanomagnetism in Patterned Structures Using SEMPA
Principal Investigator: J. Shi (Physics, University of Utah)

Direct Growth of Single Walled Carbon Nanotubes with Controlled Structures on Substrates for Device and Sensor Applications
Principal Investigator: J. Liu (Dept. of Chemistry, Duke University)

Optical Manipulation of Carbon Nanotubes: Differential Diffusion Through a New Chirality-Dependent Electric Dipole Response
Principal Investigator: W. R. Garrett (Physics & Astronomy, University of Tennessee)

Fabrication of Magnetic Nanowires and Nanowire Arrays Using Self-Assembling Polymer Templates
Principal Investigator: M. G. Bakker (Dept. of Chemistry, University of Alabama)
Collaborators: D. Nikles (University of Alabama)

Hybrid Composites of Facially Amphiphilic Phenylene Ethynylenes and Carbon Nanotubes
Principal Investigator: G. N. Tew (Polymer Science & Engineering, University of Massachusetts)

Hydrogenation of Carbon Nanotubes: Water as a Hydrogen Source
Principal Investigator: Y.-P. Sun (Chemistry, Clemson University)

Directed Assembly of Nanoparticles in Polymers
Principal Investigator: T. Emrick (Polymer Science & Engineering, University of Massachusetts)
Collaborators: T. P. Russell (Polymer Science & Engineering, University of Massachusetts)

Scaffolding of Biosynthetic Enzyme Systems to Nanostructured Electrodics for Controlled Synthesis of Inorganic Materials
Principal Investigator: D. Morse (Dept. of Molecular, Cellular & Develop. Biology, University of California)
Collaborators: M. L. Simpson (Oak Ridge National Laboratory)
T. McKnight (Oak Ridge National Laboratory)

Calculating Time Dependent Effects from a Modified Wang-Landau Density of States
Principal Investigator: M. A. Novotny (Dept. of Physics & Astronomy, Mississippi State University)

Ferromagnetic Domain Structures at Epitaxial Metal/Semiconductor Interfaces for Spintronics
Principal Investigator: H. H. Weitering (Physics & Astronomy, University of Tennessee)
Collaborators: L. C. Feldman (Vanderbilt University)
J. Shen (Oak Ridge National Laboratory)

High Production Rate Nanotube Synthesis Apparatus
Principal Investigator: M. W. Smith (NASA Langley Research Center)

Development of a Nanoscale Solvothermal Processes Laboratory (NSPL) for CNMS
Principal Investigator: D. J. Wesolowski (Chemical Sciences Division, Oak Ridge National Laboratory)
Collaborators: D. B. Beach (Chemical Sciences Division, Oak Ridge National Laboratory)
D. R. Cole (Chemical Sciences Division, Oak Ridge National Laboratory)
W. A. Hamilton (Chemical Sciences Division, Oak Ridge National Laboratory)

Nanostructured Composites as Tunable Dielectrics
Principal Investigator: M. E. Rogers (Advanced Materials, Luna Innovations, Inc.)
Collaborators: B. Koene (Luna Innovations, Inc.)
P. Stevenson (Luna Innovations, Inc.)
M. Vercellino (Luna Innovations, Inc.)

User Activity (end of June 2004)

Projects started: 25

CNMS Research Scholars Program

- **Provides merit-based, competitive awards to encourage outstanding young researchers in areas of interest to CNMS** ***Award amount ~ $3500***
- **Eligibility: Any grad student or postdoc participating in an *approved* CNMS user project (1 per project)**
- **Criteria: Academic merit; Research performance; Value of the applicant's contribution to developing user research capabilities**
- **Application Materials:**
  Brief CV; Transcript; Nomination letter from User PI;
  Candidate's statement describing his/her specific contribution to a CNMS project
- **Currently have 10 *CNMS Scholars* representing 8 universities**
- ***CNMS Scholars* will be listed on CNMS web with links to their research**

Summary

- **Already underway: A "jump start" user program to develop a vibrant user community for CNMS before opening**
- **Implementation of processes for proposal review, selection, scheduling; user access and training**
- **Development of "brand" identity among key constituencies: *Proposal Review Committee*, *CNMS Scholars, NanoFocULs***
- **The CNMS will transition to full-scale user operations in October 2005 with activities in 7 scientific theme areas**
- **CNMS will host a highly collaborative nanoscience user research program of approximately 250 users and 7,500 user-days in FY2008 (→ 10,000 user-days in steady state)**